concentration decreases non-linearly and continuously towards the layer **6** in a manner to obtain a concentration distribution such that the impurity concentration abruptly drops in the end portion of the layer **5** adjacent the layer **6** as shown in FIG. **6** which illustrates a third embodiment of the present invention, the photoelectric conversion device of the present invention produces the same excellent operation and effects as are obtainable with the photoelectric conversion device shown in FIG. **2**.

Further, the foregoing description has been given of the case where light is incident on the photoelectric conversion device from the side of the substrate **1** and, accordingly, the non-single-crystal semiconductor layer **4** of the non-single-crystal semiconductor laminate member **3** on the side on which the light is incident is P-type.

But, also in case where the photoelectric conversion device is arranged to be exposed to light on the side opposite from the substrate **1**, the non-single-crystal semiconductor layer **6** of the non-single-crystal semiconductor laminate member **3** on the side of the incidence of light is P-type, the non-single-crystal semiconductor layer **4** on the side of the substrate **1** is N-type and the non-single-crystal semiconductor layer **5** has introduced thereinto a P-type impurity (boron) which is distributed so that the impurity concentration continuously decreases towards the non-single-crystal semiconductor layer **4** in the thickness direction of the layer **5**, the same excellent operation and effects as described previously can be obtained, as will be understood from the foregoing description. In this case, however. the conductive layer **7** must be substituted with a light-transparent one. The substrate **1** and the conductive layer **2** need not be light-transparent.

While in the foregoing the non-single-crystal semiconductor laminate member **3** has one PIN junction, it is also possible to make the laminate member **3** have two or more PIN junctions and to form each of the two or more I-type non-single-crystal semiconductor layers so that the P-type impurity introduced therein may have the aforesaid concentration distribution.

It will be apparent that many modifications and variations may be effected without departing from the scope of the novel concepts of the present invention.

What is claimed is:

1. A semiconductor device comprising:

a substrate; and

a non-single crystalline semiconductor layer formed over said substrate, said semiconductor layer comprising amorphous silicon and including at least hydrogen; and

at least one intrinsic or substantially intrinsic region formed within said semiconductor layer;

at least one N-type or P-type region formed within said semiconductor layer; and

at least one NI or PI junction between said intrinsic or substantially intrinsic region and said N-type or P-type region,

wherein carbon is present in said intrinsic or substantially intrinsic region and the concentration of said carbon is less than 4×10^{18} atoms/cm^3 and not lower than 4×10^{15} atoms/cm^3.

2. The semiconductor device of claim **1** wherein said concentration of said carbon is not lower than 4×10^{15} atoms/cm^3.

3. A semiconductor device according to claim **1** wherein said intrinsic or substantially intrinsic region is formed by a chemical vapor deposition.

4. A semiconductor device comprising:

a substrate; and

a non-single crystalline semiconductor layer formed over said substrate, said semiconductor layer comprising silicon and including at least hydrogen; and

at least one intrinsic or substantially intrinsic region formed within said semiconductor layer;

at least one N-type or P-type region formed within said semiconductor; and

at least one NI or PI junction between said intrinsic or substantially intrinsic region and said N-type or P-type region, wherein carbon is present in said intrinsic or substantially intrinsic region and the concentration of said carbon is less than 4×10^{18} atoms/cm^3 and not lower than 4×10^{15} atoms/cm^3.

5. The semiconductor device of claims **1** or **4**, wherein a concentration of boron in said intrinsic or substantially intrinsic region is not higher than 2×10^{17} atoms/cm^3.

6. The semiconductor device of claims **1** or **4**, wherein a concentration of phosphor us in said N-type region is higher than 1×10^{19} atoms/cm^3.

7. The semiconductor device of claims **1** or **4** wherein said N-type region comprises microcrystalline silicon.

8. The semiconductor device of claims **1** or **4**, wherein said intrinsic or substantially intrinsic region has a thickness of 0.5 μm.

9. A semiconductor device according to claim **4** wherein said intrinsic or substantially intrinsic region is formed by a chemical vapor deposition.

10. A semiconductor device comprising:

a substrate; and

an amorphous semiconductor layer of intrinsic or substantially intrinsic conductivity type formed over said substrate, said semiconductor layer comprising silicon and including at least hydrogen; and

at least one NI or PI junction formed with said amorphous semiconductor layer,

wherein carbon is present in said semiconductor layer and the concentration of said carbon is less than 4×10^{18} atoms/cm^3 and not lower than 4×10^{15} atoms/cm^3.

11. The semiconductor device of claim **10**, wherein a concentration of boron in said semiconductor layer is not higher than 2×10^{17} atoms/cm^3.

12. The semiconductor device of claim **10**, further comprising an N-type semiconductor layer in contact with said amorphous semiconductor layer to form said NI junction therebetween, wherein a concentration of phosphorus in the N-type layer is higher than 1×10^{19} atoms/cm^3.

13. The semiconductor device of claim **10**, where said semiconductor layer has a thickness of 0.5 μm.

14. A semiconductor device comprising:

a substrate; and

an amorphous semiconductor layer of intrinsic or substantially intrinsic conductivity type formed over said substrate, said semiconductor layer comprising silicon and including at least hydrogen; and

an N-type microcrystalline semiconductor layer comprising silicon in contact with said amorphous semiconductor layer to form at least one NI or PI junction,

wherein carbon is present in said semiconductor layer and the concentration of said carbon is less than 4×10^{18} atoms/cm^3 and not lower than 4×10^{15} atoms/cm^3.

15. A semiconductor device according to claim **10** wherein said amorphous semiconductor layer is formed by a chemical vapor deposition.

16. A non-single-crystalline semiconductor material comprising silicon having at least one junction formed between a substantially intrinsic or intrinsic semiconductor material and a one conductivity type semiconductor material, said junction being one of NI and PI junctions, said semiconductor material containing at least hydrogen and wherein carbon is present in said substantially intrinsic or intrinsic semiconductor material in an amount less than 4×10^{18} atoms/cm^3 and not lower than 4×10^{15} atoms/cm^3.

17. A non-single crystalline semiconductor material according to claim **16** wherein said substantially intrinsic or intrinsic semiconductor material is formed by a chemical vapor deposition.

18. An amorphous semiconductor material comprising silicon having at least one junction formed between a substantially intrinsic or intrinsic semiconductor material and a one conductivity type semiconductor material, said junction being one of NI and PI junctions, said semiconductor material containing at least hydrogen and wherein carbon is present in said substantially intrinsic or intrinsic semiconductor material in an amount less than 4×10^{18} atoms/cm^3 and not lower than 4×10^{15} atoms/cm^3.

19. The semiconductor material of claims **16** or **18**, wherein the concentration of boron contained in said substantially intrinsic or intrinsic semiconductor material is not higher than 2×10^{17} atoms/cm^3.

20. The semiconductor material of claims **16** or **18**, further comprising an N-type semiconductor layer in contact with said amorphous semiconductor layer to form said NI junction therebetween, wherein a concentration of phosphorus in the N-type layer is higher than 1×10^{19} atoms/cm^3.

21. The semiconductor material of claims **16** or **18**, further comprising an N-type semiconductor layer in contact with said amorphous semiconductor layer to form said NI junction therebetween, wherein the N-type layer comprises microcrystalline silicon.

22. The semiconductor material of claims **16** or **18**, wherein said substantially intrinsic or intrinsic semiconductor material has a thickness of 0.5 μm.

23. An amorphous semiconductor material according to claim **18** wherein said substantially intrinsic or intrinsic semiconductor material is formed by a chemical vapor deposition.

24. A semiconductor device comprising:

a substrate; and

a non-single crystalline semiconductor layer formed over said substrate, said semiconductor layer comprising silicon and including at least hydrogen; and

at least one intrinsic or substantially intrinsic region formed within said semiconductor layer;

at least one N-type or P-type region formed within said semiconductor layer; and

at least one NI or PI junction between said intrinsic or substantially intrinsic region and said N-type or P-type region,

wherein carbon is present in said intrinsic or substantially intrinsic region and the concentration of said carbon is less than 4×10^{18} atoms/cm^3 and not lower than 4×10^{15} atoms/cm^3, and at least a portion of said intrinsic or substantially intrinsic region contains boron in a concentration 1×10^{15} to 2×10^{17}.

25. A semiconductor device according to claim **24** wherein said intrinsic or substantially intrinsic region is formed by a chemical vapor deposition.

26. A semiconductor device comprising:

a substrate; and

a non-single crystalline semiconductor layer of intrinsic or substantially intrinsic conductivity type formed over said substrate, said semiconductor layer comprising silicon and including at least hydrogen; and

at least one NI or PI junction formed with said non-single crystalline semiconductor layer,

wherein carbon is present in said intrinsic or substantially intrinsic region and the concentration of said carbon is less than 4×10^{18} atoms/cm^3 and not lower than 4×10^{5} atoms/cm^3, and at least a portion of said intrinsic or substantially intrinsic region contains boron in a concentration 1×10^{15} to 2×10^{17}.

27. A semiconductor device according to claim **26** wherein said non-single crystalline semiconductor layer is formed by a chemical vapor deposition.

28. A semiconductor device comprising:

a substrate; and

a non-single crystalline semiconductor layer formed over said substrate, said semiconductor layer comprising amorphous silicon including at least hydrogen; and

at least one N-type or P-type region formed within said semiconductor layer;

at least one second region formed within said semiconductor layer, said second region having a different conductivity type from said at least one N-type or P-type region;

at least one junction between said N-type or P-type region and said second region,

wherein carbon is present in said second region and the concentration of said carbon is less than 4×10^{18} atoms/cm^3 and not lower than 4×10^{15} atoms/cm^3.

29. A semiconductor device according to claim **28** wherein said second region is formed by a chemical vapor deposition.

30. A semiconductor device comprising:

a substrate; and

an amorphous semiconductor layer formed over said substrate, said semiconductor layer comprising silicon and including at least hydrogen; and

at least one junction formed with said amorphous semiconductor layer,

wherein carbon is present in said semiconductor layer and the concentration of said carbon is less than 4×10^{18} atoms/cm^3 and not lower than 4×10^{15} atoms/cm^3.

31. A semiconductor device according to claim **30** wherein said amorphous semiconductor layer is formed by a chemical vapor deposition.

32. A semiconductor device comprising:

a substrate; and

an amorphous semiconductor layer formed over said substrate, said semiconductor layer comprising silicon and including at least hydrogen; and

an N-type semiconductor layer comprising silicon in contact with said amorphous semiconductor layer to form at least one junction,

wherein carbon is present in said semiconductor layer and the concentration of said carbon is less than 4×10^{18} atoms/cm^3 and not lower than 4×10^{15} atoms/cm^3.

33. A semiconductor device according to claim **32** wherein said amorphous semiconductor layer is formed by a chemical vapor deposition.

34. An amorphous semiconductor material comprising silicon having at least one junction formed between a first semiconductor material and a second semiconductor mate-

rial having a different conductivity type from said first semiconductor material, said first semiconductor material containing at least hydrogen and wherein carbon is present in said first semiconductor material in an amount less than 4×10^{18} atoms/cm^3 and not lower than 4×10^{15} atoms/cm^3.

35. An amorphous semiconductor material according to claim **34** wherein said first semiconductor material is formed by a chemical vapor deposition.

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